

Acute Pancreatic Pseudocysts:

Incidence and Implications

EDWARD L. BRADLEY, III, M.D., A.C. GONZALEZ, M.D., J. L. CLEMENTS, JR., M.D.

Of 92 patients with moderately severe acute pancreatitis initially studied within three weeks of onset by ultrasonic tomography, 52 developed an acute fluid collection in the lesser sac. Documentation of the ultrasound prediction of pseudocyst was achieved by surgery or autopsy in 26 cases. Spontaneous resolution of the acute pseudocyst was demonstrated by serial ultrasonography and radiography in another 10 patients. Exploration exposed 3 false positive predictions of pseudocyst. Eleven other patients with a cystic configuration either refused surgery or were lost to followup. Acute pseudocyst formation is a relatively common phenomenon in the early phases of moderately severe pancreatitis. While spontaneous resolution of acute pseudocysts is frequent, in approximately 50% of cases acute pseudocysts progress to chronic pseudocysts. A distinction between acute and chronic pseudocyst is necessary since specific surgical management depends upon the phase of pseudocyst development. Unless regional sepsis supervenes, acute pseudocysts of less than three weeks' duration may be followed by serial ultrasonography in the hope of spontaneous resolution. When a pseudocyst has achieved chronic status, spontaneous resolution is rare. Persistent conservative management under these conditions invites the excessive mortality and morbidity of spontaneous rupture.

In the last edition of Dorland's Illustrated Medical Dictionary, the following definition is found: "Pancreatic pseudocyst: An accumulation of pancreatic juice in the retroperitoneal space as a result of necrosis and rupture of a pancreatic duct."

ANATOMICALLY based definitions of pancreatic pseudocyst have lacked necessary diagnostic precision when applied to the clinical situation. Conceivably, existing definitions of pseudocyst could be satisfied by a

*From The Departments of Surgery and Radiology
Emory University School of Medicine
Atlanta, Georgia*

number of conditions; 1) an acute collection of pancreatic juice circumscribed by thin walled membranes; 2) a chronic pseudocyst characterized by sterile contents and thick fibrous walls; 3) a secondarily infected pseudocyst; or even 4) a frank pancreatic abscess. Understandably, considerable therapeutic ambiguity has resulted from inaccurate diagnosis when such imprecise definitions have been indiscriminately applied without further qualifications. From a clinical standpoint, since the management of such diverse conditions differs markedly, it may be unwise to persist in lumping these conditions together under a single broad definition.

An accurate distinction between these specific pathologic processes should be regarded as a clinical imperative. While a great deal of information is available regarding pancreatic abscess,^{1,2} and chronic pseudocyst,^{5,14} little is known about the initiation and early development of pseudocysts; the acute pseudocyst. In the absence of such information, confusion between these related conditions may persist, and appropriate therapy unnecessarily delayed. Accordingly, in this study we have attempted to define an acute pseudocyst and to characterize the diagnosis and management of this entity.

Methods and Materials

The patient population is composed of 92 patients admitted to Grady Memorial Hospital since January of 1973 with a clinical diagnosis of acute pancreatitis and possible

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All correspondence to: Dr. Edward L. Bradley, Department of Surgery, 69 Butler Street, Atlanta, Georgia 30303.

TABLE 1. *Distribution of Type of Pancreatitis (Marseilles Classification)*

I. Acute Pancreatitis	7
II. Relapsing Acute Pancreatitis	24
III. Relapsing Chronic Pancreatitis	45
IV. Chronic Pancreatitis	16

pseudocyst formation. Eighty-five of these patients had experienced onset of acute symptoms less than 10 days preceding admission, presumably reflecting the recent onset of the pancreatic process. The diagnosis of acute pancreatitis was confirmed in each patient by a combination of historical features, physical findings, and laboratory studies.

There were 52 males and 40 females ranging in age from 14–81 years old. Eighty-five were known or suspected alcoholics (92%). Severe abdominal pain was present in 80% of the patients. All of the patients exhibited abdominal tenderness. The average oral temperature on admission was 38.3°. Thirty-eight patients presented with a palpable abdominal mass (41%) and marked displacement of the barium filled stomach was noted in 53 patients (58%). The average serum amylase was 477 Somogyi units and ranged from 210–2400 Somogyi units. White blood cell counts were persistently elevated.

The type of active pancreatitis present in these patients was further classified according to the Marseilles Classification (Table 1). That this series is heavily weighted toward recurrent pancreatitis is evidenced by the observation that 92% of cases were in Classes II, III, and IV. In addition, since these patients required admission, the degree of pancreatitis should be considered as severe and therefore perhaps not representative of the entire spectrum of the disease process.

During this same period of time, more than 600 other patients were admitted with pancreatitis in whom pseudocyst was neither suspected nor subsequently demonstrated. In general, patients with acute pancreatitis were suspected of pseudocyst formation and underwent ultrasound evaluation whenever one of the following conditions was met: 1) palpatory evidence of an abdominal mass; 2) lack of clinical improvement within one week; 3) persistently elevated serum amylase; 4) anterior displacement of the barium filled stomach; 5) evidence of intra-abdominal sepsis.

Each patient underwent evaluation of pancreatic morphology by diagnostic ultrasound using commercially available instrumentation.* Ultrasound examinations were carried out in the supine position using both transverse and longitudinal abdominal scans at 2 cm intervals. The standard criteria for the ultrasonic demonstration of cystic structures were used.¹⁰ These criteria included visualization in two planes of a trans-sonic area of at

least 2 cm in diameter, confirmation of B-mode scanning by linear A-mode presentation, verification of low amplitude findings by high gain studies, and elimination of other fluid filled structures, such as the gallbladder or stomach, by correlation with other radiographic data, and by modifying body position.

Results

An acute collection of fluid in the lesser sac was demonstrated by ultrasonography in 52 of the 92 patients with a clinical suspicion of pseudocyst and moderately severe acute pancreatitis of less than three weeks duration. In the remaining 40 cases, ultrasonic tomograms showed either pancreatomegaly (42%) or unremarkable pancreatic morphology (58%). When the 52 patients with positive ultrasonography were compared to the 40 patients in whom the clinical diagnosis of pseudocyst was not supported by ultrasound, no distinguishing clinical features were apparent (Table 2). This observation underscores the limited ability of clinical and radiographic techniques in making the diagnosis of pseudocyst.

The behavior of the patients with positive ultrasonography is of considerable interest. In general we elected to follow the course of the acute pseudocyst by a combination of frequent clinical evaluation and serial ultrasonography. However, in 14 cases of less than four weeks duration, surgical intervention was considered necessary or advisable. Three of these cases involved suspected secondary infection of the pseudocyst which was confirmed at surgery. In another patient, the onset and rapid development of obstructive jaundice thought to be secondary to pseudocyst obstruction proved not to be the case at exploration, and represents an instance

TABLE 2. *Clinical Comparison of Patients with Acute Episode of Pancreatitis and a Clinical Diagnosis of Pseudocyst*

	Positive Ultrasound	Negative Ultrasound
Number of patients	52	40
Sex distribution	M 30 F 22	M 26 F 14
Average age (yrs)	43 (14–81)	37 (18–62)
Alcoholism	48 (92%)	37 (93%)
Abdominal pain	42 (79%)	32 (81%)
Average temperature	38° (37°–39°)	38.5° (37°–39.5°)
Palpable abdominal mass	18 (35%)	20 (50%)
Average WBC count	13,100 (11,000–20,700)	13,700 (11,000–22,000)
Average serum amylase*	478 (210–1680)	474 (260–2400)
Marked displacement of Upper GI series	30 (57%)	23 (58%)

* Echoview VIII; Picker Corp., Cleveland, Ohio.

* Somogyi units.

of false positive diagnosis. The abrupt onset of peritoneal signs in another patient with chronic renal failure on maintenance hemodialysis heralded rupture of an acute pseudocyst which was confirmed at surgery. Exploration was undertaken in 4 of 6 patients with positive ultrasonography and progressively virulent pancreatitis and associated organ failure in an attempt to alter their deteriorating courses. The diagnosis of acute pseudocyst was confirmed in each of these patients. A false positive ultra-sonic diagnosis was discovered in another of these patients at autopsy. In summary, of the 9 patients with confirmed acute pseudocysts and complications, only 4 exhibited complications directly attributable to the pseudocyst per se.

An additional 5 patients underwent diagnostic laparotomy when the attending physician felt that other intra-abdominal surgically correctable processes could not be ruled out. On 4 of these occasions, the diagnosis of pseudocyst was confirmed. In 10 patients spontaneous pseudocyst regression documented by serial clinical, radiographic, and ultrasonic examinations occurred within 3 weeks of the time of onset of the particular individual episode. Difficulties with patient compliance were noted in 9 other cases and adequate evaluative data are not available.

Each of the remaining 17 patients exhibited persistence of the acute pseudocyst beyond the initial three week period of development. Fifteen of these patients later underwent definitive surgery for confirmed pseudocyst at times ranging from 5 weeks to 6 months after development. Of particular interest was the surgical observation that in these 15 patients with this more chronic type of pseudocyst, the thickness of the surrounding fibrous wall was greater than 5 mm in each instance, while pseudocyst walls were generally thinner in patients with pseudocysts of less than 3 weeks duration.

Positive confirmation of the ultrasonic diagnosis of pseudocyst was obtained by surgery or autopsy in 26 cases and by documentation of spontaneous resolution in another 10 patients. Using worst case analysis, the proved false positive rate for ultrasonography under the conditions described in this report was 11% (3/26). No false negative results were observed during this limited study.

Discussion

Although a great deal is known regarding the operative management of pancreatic pseudocysts,^{11,13,14} the criterion for inclusion into these and other retrospective surgical series has been operative substantiation of the diagnosis. Under such highly selected circumstances, natural history information derived from these reports may not be representative of the entire spectrum of the process of pseudocyst formation.

If the onset of clinical symptoms can be regarded as the onset of pancreatitis, and if the development of a demonstrable trans-sonic cystic mass in the region of the pancreas during hospitalization for pancreatitis can be equated with early pseudocyst formation, the results of this study demonstrate that acute pseudocyst formation is a frequent phenomenon in patients during moderately severe episodes of acute pancreatitis. Selecting the first three week period after development as an arbitrary definition of an acute pseudocyst, approximately half of these acute pseudocysts uneventfully progress beyond this period to the well appreciated chronic thick-walled stage. Another 25% of acute pseudocysts will undergo spontaneous resolution. Complications of pancreatitis compose the remaining quarter, although the nature of the complication can be directly attributed to the acute pseudocyst in only half of these remaining cases.

Following the pioneering abdominal ultrasonic studies of Filly and Fremanis⁷ we demonstrated the usefulness and reliability of ultrasonography specifically in the diagnosis and management of pancreatic pseudocysts.³ During the course of these investigations, the ability of pseudocysts to undergo spontaneous resolution was also documented.⁴ At that time we cautioned that "... comments on the likelihood that any given cyst may resolve spontaneously or on the frequency of cystic resolution are precocious."⁴ Unfortunately, many physicians have apparently focussed on the demonstration that pseudocysts are capable of resolution without operative intervention, and have failed to question either the frequency or the mechanisms responsible for this phenomenon.

If spontaneous resolution of pancreatic pseudocysts could be shown to be a common occurrence a regimen of non-operative management and continued observation would be eminently justified. On the other hand, untreated pseudocysts may rupture and result in an alarming increase in morbidity and mortality.⁸ This clinical dilemma has been resolved by several authors^{9,13} who have advocated immediate exploration whenever the diagnosis of pseudocyst is made. However, not only will such an approach increase the necessity for less desirable external drainage due to insufficient maturity of the pseudocyst wall,^{6,12} but exploration would be unjustified in patients who might undergo spontaneous resolution. A more appealing solution to this dilemma would involve determination of the respective frequencies of spontaneous resolution and rupture in order that a more rational decision regarding the role of surgery might be made. These data have not been previously available.

In the present study, of 38 patients with positive ultrasonography treated by continued observation, 10 underwent uncomplicated spontaneous resolution during

hospitalization. In direct contrast, only two instances of uncomplicated spontaneous resolution occurred in 41 previously studied patients with an ultrasonically demonstrated pseudocyst in whom the disease process had exceeded three weeks (unpublished data). If the former group of patients represents acute pseudocyst formation, it is this group which exhibits the greatest frequency of uncomplicated spontaneous resolution.

It is necessary to note, however, that an instance of free intraperitoneal rupture did occur within 3 weeks of onset in one of the 52 patients included in the present report. By way of comparison, in 7 of the 41 previously studied patients with chronic pseudocyst who were treated non-operatively for varying lengths of time, free intraperitoneal rupture occurred at times ranging from 8 weeks to 5 months after presumed onset and required emergency laparotomy. Three other patients demonstrated trans-enteric perforation of the pseudocyst into the gastrointestinal tract documented by barium studies. Of the 10 patients in the chronic group suffering spontaneous rupture, 4 died and 4 additional patients experienced considerable morbidity. Since the risk of rupture with delayed treatment in chronic pseudocysts appears to be high, and the expectation of spontaneous resolution is low, the rationale for continuing a policy of persistent observation of chronic pseudocysts is unclear.

What specific implications do these observations suggest for future management of patients with pancreatic pseudocysts?

Of primary importance is the realization that continued observation of chronic pseudocysts longer than 6 weeks after development, in the hope that spontaneous resolution will occur, invites rupture and its attendant morbidity and mortality. It is our opinion that the optimal time for surgery is 4 to 6 weeks after onset, at which time maturation of the fibrous walls will usually permit more desirable internal drainage. In the ab-

sence of regional sepsis signifying secondary infection or abscess formation and requiring urgent drainage, it would appear to be safe to observe an acute pseudocyst for a 3-week period. Should spontaneous resolution occur, drainage surgery is obviated. However, if, as is more common, the pseudocyst becomes complicated or persists beyond this initial period, surgical drainage represents the more rational therapy since spontaneous resolution is rare in chronic pseudocysts, and it is in chronic pseudocysts that the greatest risk of rupture appears to lie.

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